MULTIPLE RFID DOORS CONTROL SYSTEM

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"I hereby acknowledge that the scope and quality of this thesis is qualified for the award of the Bachelor Degree of Electrical Engineering (Electronics)"

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To my beloved mother and father

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ABSTRACT

These days the security system is an important part for a house or premise to avoid such incident like robbery. A lot of security systems types have been apply to make sure the safety of the premise. One of it is automatic identification system which really helpful human especially to identify the user ID (identification) of the premise. Radio Frequency Identification (RFID) is a component that suitable for this project. This project was designed and built the system using RFID for access the doors of the premise by indentify the RFID tag user. It then output their description such as ID numbers and user names to an attaches LCD screen. The system is powered by 9 V batteries or using AC TO DC adapter. The main idea in this project is to create a system which that can provide security for the safety of the premise. At the heart of project is a PIC 16F876A microcontroller will be used as a brain of the system that will control the system through a source code (C code) build using MPLab software. In this project, passive tag will be use as an identifier of the user. In the tag will be include RFID tag ID numbers of the user. Every RFID tag is unique because the ID of the tag is different for all the tag. So, it is really safe to use the RFID system for a premise security. Additionally, the PIC will process the data which receive from RFID tools and responsible for sending the output to the LCD screen which will be show the character.

ABSTRAK

Pada masa kini, sistem keselamatan adalah bahagian yang amat penting bagi sesebuah rumah atau premis untuk mengelak sebarang kejadian yang tidak diingini seperti rompakan. Pelbagai jenis sistem keselamatan telah aplikasikan untuk memastikan keselamatan sesuatu premis. Salah satu daripadanya ialah sistem pengenalpasti automatik yang amat membantu manusia untuk mengenal pasti ID (pengenalan) pengguna sesebuah premis. Pengenalan Frekuensi Radio (RFID) ialah satu komponen yang sangat sesuai untuk projek ini. Projek ini direka dan dibina sistemnya dengan menggunakan RFID melalui pintu-pintu premis dengan mengenal pasti teg RFID pengguna. Ia kemudiannya mempamirkan penerangan seperti nombor ID dan nama pengguna pada skrin LCD. Sistem ini menggunakan 2 biji bateri yang membekalkan kuasa sebanyak 9 V dan disertai 2 suis yang dapat menghidupkan dan mematikan litar dan sistem RFID. Idea utama projek ini adalah untuk mencipta satu sistem yang boleh member keselamatan kepada sesebuah premis. Pengawal mikro digunakan sabagai otak di dalam sistem ini yang akan mengawal sistem melalui satu kod C (kod sumber) yang dibina menggunakan pekakas lembut MPLab. Di dalam projek ini teg pasif akan digunakan sebagai pengenalan pengguna. Di dalam setiap teg mengadungi nombor ID pengguna. Setiap RFID teg adalah unik kerana di dalam setiap teg mempunyai nombor ID yang tersendiri yang berbeza bagi setiap teg. Jadi, ianya amat selamat menggunakan sistem RFID untuk keselamatan sesebuah premis. Tambahan pula, PIC akan memproses data yang diterima dari peralatan-peralatan RFID dan bertanggungjawab menghantar keluaran kepada skrin LCD yang akan ditunjukkan dalam bentuk karektor.

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LIST OF ABBREVIATIONS

RFID	=	Radio Frequency Identification
LCD	=	Liquid Crystal Display
MHz	=	Megahertz
GHz	=	Gigahertz
PIC	=	Programmable Intelligent Computer
V	=	Volts

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CHAPTER 1

INTRODUCTION

This chapter explains the background of Radio Frequency Identification (RFID) technology Multiple RFID Door Control System. The development of this project entirely depends with the assistance of RFID technology, microcontrollers, DC motors and programming language. The problem statement of this project, the objective of the project and project scopes are also elaborated in this chapter.

Radio Frequency Identification (RFID) technology is expanding rapidly with its applications in a wide range of area. RFID technology consist of RFID reader and RFID tags. There are generally two types of RFID tags: active RFID tags, which contain a battery and thus can transmit its signal autonomously, and passive RFID tags, which have no battery and require an external source to initiate signal transmission. In this project, passive RFID tag is used. This technology has become an intermediate in a wide variety of applications such as in industries as an instrument for identification, in automobile manufacturing and homeland security applications. The primary goal of RFID technology is to automatically identify data that are contained in electromagnetic fields. RFID tags do not require any physical contact with the reader for identification

process. Most RFID tags are inexpensive and small where it derives its power from the signal produced by the RFID reader.

There are various types of microcontroller available nowadays, from various manufacturers, with different functionalities. PIC, MC68HC11 from Motorola, and Basic Stamp are among of the commonly used microcontroller in electronic control devices today. Some applications of microcontroller are controlling the rotation of DC motor including forward and reverse. For simple application of DC motor control the PIC is suitable to used because of it simples and unique features.

1.1 Design Objectives

The objective of this project is to design and develop the RFID technology for multiple doors security system where the accesses to all doors are controlled by one main control system.

1.2 Project Scope

a. The multiple RFID doors security system is the doors accesses can only be access by the IDs that has been preprogram into the PIC16F876A. For the doors access, the received RFID tag ID will be compared with preprogram ID is using PIC16F876A.

b. For matching ID, it will allow the user to access which door that has been preprogramming for the ID. If the ID (non-user) is not match they will not gain access for the doors system.

CHAPTER 2

LITERATURE REVIEW

This chapter discusses elaborately the system designs that have been implemented in the final system.

2.1 Radio Frequency Identification (RFID)

RFID is a dedicated short range communication (DSRC) technology. The term RFID is used to describe various technologies that use radio waves to automatically identify people or objects [1]. RFID technology is similar to the bar code identification systems we see in retail stores everyday; however one big difference between RFID and bar code technology is that RFID does not rely on the line-of-sight reading that bar code scanning requires to work [1].

2.1.1 RFID History

It's generally said that the roots of radio frequency identification technology can be traced back to World War II [2]. The Germans, Japanese, Americans and British were all using radar—which had been discovered in 1935 by Scottish physicist Sir Robert Alexander Watson-Watt—to warn of approaching planes while they were still miles away [2]. The problem was there was no way to identify which planes belonged to the enemy and which were a country's own pilots returning from a mission [2].

The Germans discovered that if pilots rolled their planes as they returned to base, it would change the radio signal reflected back [2]. This crude method alerted the radar crew on the ground that these were German planes and not Allied aircraft (this is, essentially, the first passive RFID system) [2].

Under Watson-Watt, who headed a secret project, the British developed the first active identify friend or foe (IFF) system [2]. They put a transmitter on each British plane. When it received signals from radar stations on the ground, it began broadcasting a signal back that identified the aircraft as friendly [2]. RFID works on this same basic concept. A signal is sent to a transponder, which wakes up and either reflects back a signal (passive system) or broadcasts a signal (active system) [2].

Advances in radar and RF communications systems continued through the 1950s and 1960s [2]. Scientists and academics in the United States, Europe and Japan did research and presented papers explaining how RF energy could be used to identify objects remotely [2]. Companies began commercializing anti-theft systems that used radio waves to determine whether an item had been paid for or not [2]. Electronic article surveillance tags, which are still used in packaging today, have a 1-bit tag [2].

The bit is either on or off [2]. If someone pays for the item, the bit is turned off, and a person can leave the store [2]. But if the person doesn't pay and tries to walk out of the store, readers at the door detect the tag and sound an alarm [2].

2.1.2 The Technology Behind RFID

With RFID, the electromagnetic or electrostatic coupling in the RF (radio frequency) portion of the electromagnetic spectrum is used to transmit signals [1]. An RFID system consists of an antenna and a transceiver, which read the radio frequency and transfer the information to a processing device (reader) and a transponder, or RF tag, which contains the RF circuitry and information to be transmitted [1]. The antenna provides the means for the integrated circuit to transmit its information to the reader that converts the radio waves reflected back from the RFID tag into digital information that can then be passed on to computers that can analyze the data [1].

2.1.3 RFID Reader

An RFID reader is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves; the tag responds by sending back its data [3].

A number of factors can affect the distance at which a tag can be read (the read range) [3]. The frequency used for identification, the antenna gain, the orientation and polarization of the reader antenna and the transponder antenna, as well as the placement of the tag on the object to be identified will all have an impact on the RFID system's read range [3].

2.1.4 Types Of RFID Tags

In RFID systems, the tags that hold the data are broken down into two different types [1]. Passive tags use the radio frequency from the reader to transmit their signal. Passive tags will generally have their data permanently burned into the tag when it is made, although some can be rewritten [1].

Active tags are much more sophisticated and have on-board battery for power to transmit their data signal over a greater distance and power random access memory (RAM) giving them the ability to store up to 32,000 bytes of data [1].

2.2 System Block Diagram

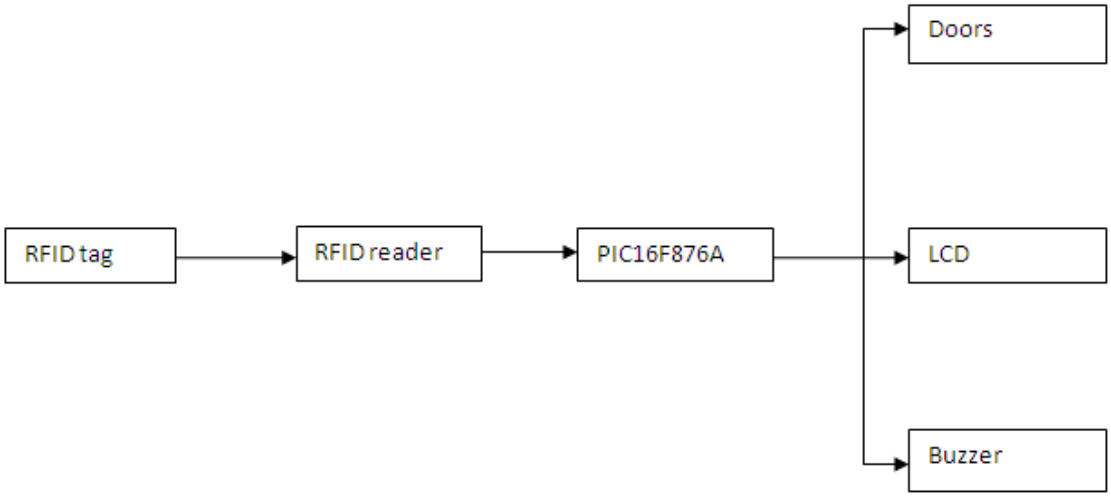

Figure 2.1: Block Diagram for Multiple RFID Doors Control System

Figure 2.1 is a simple block diagram of the system. Basically, from the block diagram, this module can be divided into 3 parts. They are RFID transmitting and receiving, microcontroller main circuit, and the output including doors, LCD display and buzzer.

For the RFID transmitting and receiving part, the RFID reader will receive the data (incoming signal) from the passive tag. Then the data will be transmit to the microcontroller main circuit for the comparing the data with the preprogram data.

For the microcontroller main circuit microchip PIC16F876A is being used. This main circuit is the heart of the whole systems where all input and output will be control from this circuit. C programming language is been use for programming design to

control the system. In this part the data that has being receive from the RFID reader will be compare with the preprogram data to control the output.

For the output part, the data that has been compare with the preprogrammed will give access to which doors the user can access. The L293D motor driver and two DC motors will make up for the doors. The buzzer will be the indicator for user or non-user and the LCD display is for displaying the name and ID of the RFID tag user.